THE LARGE FRUITED AMERICAN OAKS.

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Plates I–III.

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When Alphonse de Candolle monographed the oaks of the world something over a generation ago,[1] he distinguished with a varietal name a form of our common white oak with small acorns some 8 × 14 mm., which Engelmann had sent him—the usual fruit of *Quercus alba* measuring about 14 × 18 mm. Those who have examined numerous specimens of our common red oak, *Q. rubra,* and its double, *Q. Schneckii,* have noted that they occur in forms varying in diameter of the acorn from about 10 to about 20 mm. The assemblage of forms clustering about the Californian *Q. chrysolepis,* the oldest of our existing types of oak, geologically, also show a comparable or even greater difference in the size of the fruit of what are otherwise held to be mere variants of a single species; and the polymorphic *Q. dumosa* presents a similar if less extended range of fruit size.[2]

The most surprising of our species in this respect is the bur oak, which joins to its great range in size a difference in fruit which is even more startling; for while the usual diameter of the acorns of this species is somewhere about 25 mm., and of the cup five or ten millimeters more, the acorns frequently measure 40 mm. in diameter with a cup fully 50 mm. across on the one hand, while on the other hand they may scarcely reach a diameter of 10 mm. Perhaps no oak presents so great a range of cup characters as this species does.[2] While the round or ovoid scaly-fringed form covering the acorn nearly or quite to its top is taken as the most typical and has given to the tree its common name of mossy or overcup oak, it is not uncommon to find a broad saucer-shape assumed with the fringe of slender scales either seemingly absent, because closely inflexed beside the acorn, or extended in its development over a considerable part of the outside of the cup; and it is even possible, as Professor Pieters has recently shown me by material collected about Ann Arbor, for the cup of the smaller type of fruit to be shallow and thin as in the post oak, and either delicately ciliate at top or entirely without a fringe even on a single tree.

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[1] *Quercus alba microcarpa* A. de Candolle, Prodromus, 16^2 22. 1864.

[2] On these consult Sargent, Silva, vol. 8.

Even the largest acorns produced by these or our other familiar oaks seem small when compared with those of some tropical species of *Quercus,* or of the related genus *Pasania.* On our own continent, where the true oaks extend from the far north into the high Andes of Colombia, these large-fruited species are of both the red—and white-oak groups,—the former in Guatemala and Chiapas, and the latter in the last-named state of Mexico and along the flanks of the eastern Sierre Madre range above Vera Cruz. In contrast with these, which may reach a diameter of 50 or even 60 mm., the smallest acorns, also Guatemalan and Mexican, and of the group of red oaks, scarcely measure 5 mm. in diameter.[3]

Some two years ago, while looking over a series of type photographs that I had made in the course of a systematic revision of the oaks of tropical America, Mr. Walter Swingle, of the National Department of Agriculture, expressed considerable interest in some of the east-Mexican large-fruited white oaks as affording a hopeful field for experimentation both in direct propagation and hybridization, with reference to our own tropical and subtropical regions, and Mr. David Fairchild, of the same government department, considered the matter of sufficient interest to undertake importations through the interest of Dr. C. A. Purpus, whose collections in the southern republic have done much of recent years to make its vegetable wealth known. The purpose of the present communication is to give a connected account of these large-fruited species, because of this popular interest that they possess.

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[3] *Quercus parviglans* n. nom.—*Q. microcarpa* Liebmann, Overs. Dansk. Vidensk. Selsk. Forhandl. 1854: 184.—Liebmann-Oersted, Chênes Amer. Trop. 26. *pl. 6.*—Not *Q. microcarpa* Lapeyrouse, Hist. Abr. Pl. Pyren. 582. 1813. Equally small are the racemed acorns of an as yet unpublished group of west- and south-Mexican species of the red oaks; and the east-Mexican white oak, *Q. glabrescens,* possesses an equally small-fruited variety.

The first of the large-fruited tropical American species to be made known is *Quercus Skinneri*[4] collected by Hartweg at Quezaltenango, Guatemala, which Bentham noted and illustrated in 1841 and described the following year. Skinner's oak is a large tree with long-petioled, ovate, acute, rather blunt-based aristately toothed glabrous leaves about 5 × 9 cm., producing solitary or paired short-stalked fruit resembling that of our common red oak but on a much larger scale, the shallow cup 50 mm. in diameter and the short-ovoid acorn of about that length. It is a red oak with the usual characters of apical abortive ovules and tomentose interior of the shell, but the latter is thicker than usual and with the septa intruded into the kernel so as to make the latter somewhat three-lobed. Of recent years *Q. Skinneri* has been collected only by Cook and Griggs, at the Finca Sepacuite, Guatemala. A similar, if not the same, red oak, but with larger duller winter buds and lance-elliptical leaves as much as 20 cm. long, was collected at Chinantla, in the Mexican State of Oaxaca, by Liebmann in the fall of 1842, but of it nothing else is known: as with *Furcræa longæva,* the species seems to range extensively through the Cordillera.

Closely related to Skinner's oak is a species recently collected by Dr. Purpus in the Mexican state of Chiapas, the similar acorns of which may reach a diameter of over 35 mm., their very shallow cups, with thickened scales, sometimes measuring 45 mm. across. This, which differs markedly from *Quercus Skinneri* in having acutely lanceolate very short-stalked leaves about 5 × 12 cm., may be called *Q. chiapasensis.*[5] Like the other oaks here under consideration, it appears to become a tree of very large size.

The year following the full description of *Quercus Skinneri,* the Belgian botanists Martens and Galeotti described under the name

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[4] *Quercus Skinneri* Bentham, Gard. Chron. 1841: 16. *f.*; Pl. Hartweg. 90. 1842.—Hooker, Icones Plant. 5. *pl. 402.*—Liebmann-Oersted, *l. c. pl. B, 3.*

[5] *Quercus chiapasensis* n. sp. Arbor grandis: foliis brevipetiolatis, acutis, lanceolatis, aristato-dentatis; fructu magna; cupula plana, glabra, crassa; glande semiglobosa, 35 mm. diametro. *Q. Skinneri* affinis.

Q. insignis[6] what must be regarded as most notable in its genus because of the enormous height of the trees and the production of acorns occasionally fully 60 mm. in diameter and thus out of comparison with those of any black oaks and even with those of such Asiatic Pasanias as *P. cornea*. *Quercus insignis,* which occurs along the upper flanks of Mount Orizaba in eastern Mexico, is a white-oak, with the interior of the acorn shell not woolly, and with deeply lateral ovules. Its short-petioled elliptical-oblanceolate more or less acuminate leaves are sharply low-serrate but without bristle-like tips to the teeth, and measure 5 × 10 cm. or more. The fruit, which matures the first season, as seems to be true of all white oaks, is typically biscuit-shaped and about one-fourth shorter than thick, and the rather shallow cup, which may reach 80 mm. in diameter, is covered with coarse heavy loosely ascending scales.

Martens and Galeotti do not appear to have seen more than one form in the oaks of this kind; but the type collection of Galeotti as represented in the museum at Budapest contains acorns of two sorts, one depressed, and the other acuminately conical and about as long as thick. At about the same time that Galeotti's collections were made, the Danish botanist Liebmann collected in the same general region materials of an oak similar to *Q. insignis* but differing in bearing subconical acorns about as long as broad and with more turbinate cups. This was published by its discoverer in 1854 under the name *Q. strombocarpa.*[7] Subsequently when a series of exquisite drawings of Mexican oaks prepared under Liebmann's direction were published by Oersted, the latter added a plate of a very similar form, which he called *Q. insignis strombocarpoides.*[8] It is hard to see how the latter can be distinguished from *Q. strombocarpa,* and the Galeotti collection shows that, different as the fruit extremes are, the discoverer of *Q. insignis* did not separate from its typical form the conical-fruited form to which apparently both of the later names refer.

[6] *Quercus insignis* Martens and Galeotti, Bull. Acad. Brux. 10^2: 219. 1843. —Liebmann-Oersted, *l. c. pl. K, 29.*

[7] *Quercus strombocarpa* Liebmann, Overs. Dansk. Vidensk. Selsk. Forhandl. 1854: 176.—Liebmann-Oersted, *l. c.* 24. *pl. 27.*—Oersted, Bidrag Kundsk. Egefamilien. 346. *f. E.*

[8] *Q. insignis strombocarpoides* Liebmann-Oersted, *l. c. pl. 28.*

Wishing materials that should throw light on this question, I turned in 1912 to my amiable correspondent, Dr. Purpus, who was then in eastern Mexico: but before my letter reached him, Dr. Purpus had gone into southern Mexico. The result of my appeal, therefore, was not further specimens of *Quercus insignis,* but collections of an equally large and almost equally large-fruited white oak which appears to be characteristic of the Chiapas region. With somewhat similar but more deeply toothed leaves about 7 × 20 cm., equally short-petioled, this combines a stoutly stalked turbinate cup as much as 60 mm. in diameter, the scales of which are barely if at all free at tip with their bases connate in zones; and the ovoid pointed acorn measures 40–50 × 50–60 mm. Though closely related to *Q. insignis,* this species is so distinct in its collective characters as to stand as the type of a separable group of white oaks, and it has been called *Q. cyclobalanoides*[9] because of its very peculiar cup-markings.

EXPLANATION OF PLATES.

(All figures are of natural size.)

PLATE I.

Quercus macrocarpa. Above, three acorns from a very small-fruited Michigan tree (*Pieters*), partly with and partly without fringe to the cup, and a single fruit of the largest and "mossiest" type from Illinois (*Adams*). Below, two of the more typical acorns of different cup-depth, and a cup showing a not infrequent inrolling of the inner scales, also from Illinois (*Adams*).

PLATE II.

Above, two cups and three acorns of the large-fruited Mexican red oak, *Quercus chiapasensis* (*Purpus*). Below, basal and side view of two acorns of the large-fruited Chinese oak, *Pasania cornea* (after photographs by Fairchild).

PLATE III.

Above, two fruits of the Mexican ring-scaled white oak, *Quercus cyclobalanoides* (Chiapas, *Purpus*). Below, a fruit of the great-acorned Mexican white oak, *Quercus insignis* (Huatusco, *Purpus*).

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[9] *Quercus cyclobalanoides* n. sp. Arbor grandis; foliis brevipetiolatis, acutis, oblanceolatis, mucronato-dentatis: fructu magna; cupula turbinata, luteo-tomentosa, pluriannulata; glande ellipsoidea, sub 50 mm. diametro. *Quercus* Insignes valde affinis, sed sectio distincta, Cyclobalanoideæ, constituens.—*Q. insignis* Journal of Heredity, 5: 407. *f. 12.* 1914—not Martens and Galleotti, *l. c.*